

We claim:

5 1. A process for preparing high-concentration gaseous formaldehyde having a molar CH₂O : H₂O ratio of ≥ 0.6 from an aqueous formaldehyde solution by evaporation of at least part of the solution, in which the aqueous formaldehyde solution is heated to a evaporation temperature T and the gas phase formed is taken off, wherein the evaporation temperature T obeys the relationship:

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$$T [^{\circ}\text{C}] \geq T'_{\min} [^{\circ}\text{C}]$$

where $T'_{\min}(c) = A + B \times (c/100) + C \times (c/100)^2 + D \times (c/100)^3$

and

15 $A = + 68.759, B = + 124.77, C = - 12.851, D = - 10.095,$

where c is the instantaneous CH₂O content of the aqueous formaldehyde solution during the evaporation in percent by weight and is from 20 to 99% by weight.

20 2. A process as claimed in claim 1, wherein the aqueous formaldehyde solution used as starting material in the process has a CH₂O content of from 50 to 99% by weight.

3. A process as claimed in claim 2, wherein the aqueous formaldehyde solution has a CH₂O content of from 70 to 90% by weight.

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4. A process as claimed in any of claims 1 to 3, wherein the pressure during the evaporation is from 0.1 to 50 bar.

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5. A process as claimed in any of claims 1 to 4, wherein the molar CH₂O : H₂O ratio is $\geq 1.4.$

6. A process as claimed in any of claims 1 to 5, wherein a temperature which obeys the relationship

$$T [^{\circ}\text{C}] \geq T''_{\min} [^{\circ}\text{C}]$$

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where $T''_{\min}(c) = A' + B' \times (c/100) + C' \times (c/100)^2 + D' \times (c/100)^3$

and

$A' = + 6.0156, B' = + 52.918, C' = + 49.699, D' = + 34.286,$

where c is the instantaneous CH_2O content of the aqueous formaldehyde solution during the evaporation in percent by weight and is from 20 to 99% by weight,

5 is maintained in the aqueous formaldehyde solution at every point in the evaporator.

7. A process as claimed in any of claims 1 to 6, wherein the evaporation is carried out in a stirred vessel, a helical tube, a film evaporator or another apparatus having heat exchanger characteristics.

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8. A process as claimed in any of claims 1 to 7, wherein the aqueous formaldehyde solution used as starting material in the process is prepared by oxidative dehydrogenation of methanol.

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9. The use of high-concentration gaseous formaldehyde obtainable by a process as claimed in any of claims 1 to 8 for preparing trioxane, tetraoxane, butynediol, diphenylmethanediamine and dioxolane.